

PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in and relating to Photographic Reflex-Copying.

We, SOCIETE LUMIERE, a Body Corporate recognised by the laws of France, of 25 rue du Quatre Septembre, Paris, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the reproduction of documents by reflex-copying, that is to say, by a method in which a photographic paper is placed on the document to be reproduced, with the sensitive side of the paper in contact with the side of the document that bears the matter to be copied, and the matter to be copied is illuminated through the photographic paper instead of through the document as in other methods of reproduction. The action of the light upon the photographic paper is then strongest at the points where the paper is in contact with a white area of the document and weakest where the paper is in contact with a black area. When a suitable photographic paper is used, the difference between the degree of illumination of the paper where it is in contact with light and dark areas of the document is sufficient to give satisfactory reproduction of the document.

If the quality of reproduction is to be satisfactory over the whole area of the document, however, it is essential that the photographic paper should everywhere be in intimate contact with the document, because otherwise the copy produced will contain patches, corresponding to areas where the paper and the document were not in intimate contact during copying, where the reproduction is more or less indistinct. It is also necessary for the illumination to be uniform because variations lead to variations in the difference between the degree of illumination

of areas of the paper in contact with white and black zones of the original document. 45

Although the above-mentioned conditions can readily be realized in the reproduction of documents that are in the form of separate sheets which lend themselves to being placed flat on a table and to receiving uniform illumination from a suitably arranged source, this is not the case when the document to be reproduced consists of a page in a bound book of some bulk. Such a book does not easily open out flat and if, in an attempt to remedy this difficulty, the book is only partly opened, the raised half forms a screen which, with the conventional method of illumination, prevents the uniform lighting of the page that is to be reproduced. The usual practice is to open the book fully by force and to compress strongly the part situated below the page to be reproduced, which tends to cause the binding to deteriorate. Further, in spite of taking these steps, the part of the page that is close to the binding is often reproduced only in a very unsatisfactory manner so that the process gives acceptable results only if the inner margin of the page in question is sufficiently wide. 50 55 60 65 70

It is an object of the present invention to remedy these disadvantages and to make possible the reproduction by reflex-copying of any page of a bound book, even a bulky book, without damaging the binding and without obtaining poor reproduction in the region close to the inner margin, even where the latter is very narrow. 75

According to the invention, the illumination of the photographic paper placed upon the page to be reproduced is effected by reflection or diffusion by the opposite page, or by a surface applied to the latter, of the light derived from an incident beam orientated in a general direction more or less parallel with the photographic paper. It will be under- 80 85

stood that in this way the ordinary light source, for example, an electric lamp, is in a way substituted by a secondary light source, constituted by the opposite page or 5 by the diffusing surface applied to it.

In one form of the invention there is placed between the relevant pages of the book (that is to say between the page to be reproduced, which is covered by the photographic paper, and the opposite page) a plate of transparent material with parallel or substantially parallel faces in which one of these faces, for example the one in contact with the paper, is preferably ground, and this 10 plate is illuminated at one of the edges situated outside the book in such a way that the rays which can thus penetrate into the plate undergo total reflection on the surface opposite the surface in contact with the photographic paper, then impinge upon the photographic paper where they are partly diffused outwardly and partly reflected towards the opposite surface, there to undergo 15 another total reflection, and so forth. It will be understood that if the extent to which the surface in contact with the paper is 20 ground is suitably graded in relation to the distance from the edge at which the light enters, a uniform illumination of the paper 25 can thus be obtained and reproduction by reflex-copying can be achieved with the book closed (but with two adjacent pages 30 separated by the plate).

It should be understood that in this form 35 of the invention the plate must have a certain thickness without which the light in it would undergo a considerable number of reflections and the luminous energy would decrease far too quickly with increasing distance from the illuminated edge. This thickness may be a disadvantage in the case of a 40 very bulky book because, in order to avoid damage to the binding, it may be necessary to limit the extent to which the plate is inserted between the pages, which prevents the 45 reproduction of that area of the pages which is close to the binding.

According to another form of the invention, instead of keeping the page to be reproduced and the opposite page, or the reflecting and/or diffusing surface placed 50 against it, parallel with one another, the book is opened at a slight angle and the said opposite page or the said reflecting surface, 55 is illuminated by means of a beam of light substantially parallel with the photographic paper. In this form, the space between the page to be reproduced and the opposite page 60 can be regarded as constituting a transparent wedge of comparatively small angle in which the oblique face or inclined plane is illuminated by rays substantially parallel with the base and forms a reflecting diffusing surface in order to illuminate the base under 65 which the photographic paper is placed, the

photographic paper itself being placed on the page to be reproduced. The wedge in question may be constituted by atmospheric air in which case a device for putting into practical effect the present invention may 70 consist of a rigid transparent plate which forms the wedge base and ensures the application of the paper to the page to be reproduced, and a diffusing or reflecting plate which forms the inclined plane above this 75 space. Instead, the above-mentioned wedge may be constituted in its entirety by a solid transparent substance. Then the light rays penetrate into this wedge of transparent material through the surface perpendicular on the base, with the latter resting on the photographic paper, and become reflected or diffused by the inclined plane, in order to effect the illumination of the base and, consequently, of the paper. It will be understood that this variant derives directly from the first-mentioned form of the invention, with the two plate surfaces no longer parallel, but enclosing between themselves a comparatively small angle. If this angle is sufficiently large (for example, of the order of 10 to 20°), it is not necessary to grind the surface of the wedge that is in contact with the photographic paper, provided that the incident beam is made slightly convergent, in order to attain a uniform illumination which does not depend upon the distance from the surface at which the light enters the wedge. To avoid unnecessary complication of the present description, this slight convergence 100 will be neglected from now on and it will be assumed that the incident light rays are parallel unless the contrary is stated.

In all the forms of the invention described herein, the divergent or convergent or parallel light beam may be achieved by means of an apparatus comprising the conventional optical means, that is to say, reflectors, lenses etc. The luminous source of this apparatus is preferably of tubular shape and arranged 105 with the axis of the tube parallel to the longitudinal axis of the bound book. A fluorescent lamp may be used, for example. However, it is also possible so to shape the entry surface of the device (whether it be 110 a plate with parallel surfaces or an air wedge or a wedge of transparent material) that it forms a lens which receives a beam derived from a conventional light source, especially 115 a tubular light source, and transforms it into 120 a beam of parallel, divergent or convergent rays according to requirements. In the case of a plate with parallel surfaces or of a wedge of transparent material, the entry surface may itself be of cylindrical cross-section 125 so as to constitute a lens.

Advantageously, a layer of resiliently deformable transparent material is placed between the base of the wedge or of the plate, and the photographic paper so as to ensure 130

that the photographic paper is pressed uniformly against the page, notwithstanding local flatness defects which might otherwise result in variations in the applied pressure 5 (especially in old books). Another solution, which may be expected to provide better results, consists in the use of the device described in French Patent Specification No. 1,048,025. According to that Specification, 10 in order to achieve uniform application of a photographic paper to a document to be reproduced by reflex-copying, a thin pneumatic cushion of transparent material is used which is placed between this paper and a plate of rigid transparent material. In the 15 case of the present invention, the pneumatic cushion may be placed between the paper and either the plate having parallel surfaces or the base of the wedge.

20 Preferably, uniform illumination of the surface of a wedge of transparent material which forms the inclined plane (with the purpose of letting this surface play the part of a secondary luminous source that provides 25 uniform illumination of the base) is achieved by using a wedge that is constituted by superimposed layers of transparent material that extend parallel with the base, without interposing an intermediate substance having a refractive index close to that of the substance from which the layers are composed. It is possible, for example, to stack 30 plates of a comparatively rigid transparent plastic material, and to cut the assembly in 35 the shape of a wedge. If the entry surface of such a wedge is illuminated with a beam of comparatively slightly divergent rays such as may be obtained, for example, by means of a tubular electric lamp located at a suitable 40 distance, the light rays which penetrate into each elementary layer cannot leave this layer, owing to the phenomenon of total reflection, until they impinge upon the surface forming the inclined plane. This latter surface 45 diffuses the rays in a mean direction that is perpendicular to the planes of the consecutive layers so that the light rays derived from this diffusion can easily traverse the superimposed layers and reach the photographic paper. Such an arrangement 50 makes all systems comprising lenses, or parabolic or other reflectors unnecessary.

In an arrangement of this kind it is 55 advantageous to give to the plates which constitute the consecutive layers a progressively increasing thickness starting from the photographic paper, with a view to limiting the increase in the loss of light transmitted towards the photographic paper suffered, when the latter 60 has to traverse increasingly numerous layers.

According to another form of the invention, an air wedge is formed by means of a bag consisting of a transparent plastic material which is inflated between the opposite 65 pages of the book. Such a bag ensures by itself a uniform pressure of the photographic paper upon the page to be reproduced, in the manner of the pneumatic cushion described in the above-mentioned French Patent Specification No. 1,048,025. The 70 part of the cushion that is in contact with the opposite surface may be rendered diffusing or be provided with a soft or rigid diffusing coating. In front of the part of the cushion that forms the entry surface, there may be provided a lens arranged so as to ensure the formation of a beam of rays substantially parallel with the base by means of an ordinary light source, such lens being supported by a suitable fixture or adhesively 75 united with the entry surface itself.

80 When a wedge-shaped device is used, the positioning of the book can easily be ensured by means of a support in which the book is placed in an almost vertical position, such support being adjustable to enable it to be used with books of various thickness. In this case, the opposite pages are kept open by means of the wedge-like device which is pushed in between them, without any special holding system having to be 85 provided.

90 Several forms of the invention will now be described by way of example in greater detail with reference to the accompanying drawings in which:—

Fig. 1 is a side elevation of a book in which has been inserted a plate with parallel surfaces;

95 Fig. 2 is a side elevation of a book opened at a small angle to show the principles of operation using a transparent wedge;

Fig. 3 is a section of an air wedge device;

100 Fig. 4 is a side elevation and shows diagrammatically how the device shown in Fig. 105 3 can be used;

Fig. 5 shows a wedge-like device of transparent material which can be used instead of the device shown in Fig. 3;

110 Figs. 6 and 7 show devices constituting an air wedge and a wedge of transparent material, respectively, in which a cylindrical entry lens has been provided;

115 Fig. 8 shows a device which in its outlines is the same as that in Fig. 7 and with which a layer of resilient transparent material (shown in section) has been associated on the underside;

120 Fig. 9 shows a device as shown in Fig. 7 with which a pneumatic cushion has been associated;

Fig. 10 is a section of a wedge-like device of transparent material, composed of stacked consecutive layers;

125 Fig. 11 is a section of an air wedge device constituted by a pneumatic cushion; and

Fig. 12 shows how the book to be reproduced can be placed in a substantially vertical support so as to facilitate the use of a wedge-like device.

Referring to Fig. 1 of the drawings, a thick book 1, a page of which is to be reproduced by reflex-copying, is placed horizontally on a table so that the page to be reproduced is facing upwardly, above a first stack 1a of pages. On the page to be reproduced, there is placed a photographic paper 2 with the sensitive layer face down. For the purpose of illuminating this paper, 5 a plate 3 of transparent material with parallel faces is placed upon the photographic paper 2, the plate 3 having a polished upper surface 3a and a suitably ground lower surface 3b. The book has been reclosed upon 10 the plate 3, so that the plate is covered by another stack 1b of pages. The edge of the plate 3 situated outside the book 1 and parallel with the binding of the latter is illuminated by means of a convergent beam obtained from a tubular electric lamp 4 extending parallel with the spine of the book, 15 and an optical system comprising a cylindrical lens 5 and a reflector 6. It will be understood that the light rays which penetrate into the plate 3 undergo total reflection at the polished upper surface 3a and impinge upon the ground lower surface 3b which partly diffuses them downwardly and partly reflects them upwardly. The downwardly diffused rays illuminate the paper 2, whilst the upwardly reflected rays again undergo total reflection at the upper surface 3a, of the plate 3 so that they impinge again upon the lower surface 3b a little further 20 on, and so forth. By suitably grading the extent to which the surface 3b is ground in accordance with the distance from the light entry edge, it is possible to achieve an absolutely uniform illumination of the photographic paper 2.

The device shown in Fig. 1 is extremely simple, but it suffers from the disadvantage that, owing to the thickness which the plate 3 must have, in order to limit the losses of luminous energy, this plate can only be inserted into the book to a limited extent, as can be seen easily from Fig. 1. If the narrowness of the inner margin is small enough to render this disadvantage important, 45 it can sometimes be overcome by slightly lifting the upper stack of pages 1b, that is to say, by opening the book 1 a little, but it is preferable to use instead the arrangement shown in Fig. 2.

Referring to Fig. 2, the book 1 is opened 55 at a comparatively small angle which might in practice be within the range of from 10° to 20°. Here again the page to be reproduced is the uppermost page of the lower stack 1a upon which the photographic paper 2 has been placed (with the sensitive layer face down). In order to print on this paper, the 60 opposite page 7 (that is to say, the undermost page of the stack of pages 1b which has been lifted so as to open the book) is

illuminated by means of a beam of rays 8 which are parallel with the plane of the paper 2 (that is to say, horizontal in the case shown). It will be understood that these rays must impinge upon the page 7 at a very small angle and that, if this page possesses adequate light-diffusing properties, it will itself constitute a secondary light source effecting the uniform illumination of the paper 2.

It will be understood that, if the page 7 does not have the required properties, a rigid plate can be applied to it, the free surface of which has these properties. Also, the uniform application of the photographic paper 2 to the page to be reproduced can be ensured by placing upon this paper a plate of transparent material. Whatever the method adopted, the reproduction of the page can be carried out with the opening angle of the book considerably reduced as compared with conventional methods so that the major difficulties in keeping the page to be reproduced flat do not arise and the force that has to be applied is very small and introduces no risk of damaging the binding of the book.

The page to be reproduced and the opposite page together define a space in the shape of a wedge and the method consists essentially in directing a beam of parallel rays onto the entry surface (in this case vertical) of this wedge, so that they become diffused at the surface which constitutes the inclined plane and effect uniform illumination of the wedge base on which the photographic paper 2 rests.

In the arrangement shown in Fig. 3, the above-mentioned wedge consists of a volume of air situated between a transparent plate 9, 105 which forms the base of the wedge, and a rigid plate 10 arranged obliquely above the plate 9. The plate 10 may be of metal, its lower surface having been rendered light diffusing by, for example, grinding or the 110 application of a matt varnish. The two plates 9 and 10 may be connected by lateral flanges 11 in order to give a rigid assembly. This assembly, which is indicated generally by the reference numeral 12, may be placed 115 inside the book 1 (see Fig. 4) which has been opened at the desired angle so that the plate 9 rests on the photographic paper 2. Illumination is provided by an electric tube 4 and an associated optical system 5, 6 120 which, in this case, is arranged in such a way as to produce a beam of parallel rays 8.

In the arrangement shown in Fig. 5, the wedge is in the form of a block 13 of suitable transparent material, for example, glass 125 or a synthetic material. The upper face, which constitutes the inclined plane, is rendered diffusing in any desired manner so that it scatters the horizontal light rays 8, which have penetrated through the entry 130

face 13a (the vertical face) of the wedge, uniformly towards the horizontal base of the wedge.

It should be pointed out that the wedge 13 of Fig. 5 may be considered as having been derived from the plate 3 shown in Fig. 1 by inclining the upper face 3a of the plate 3 relatively to the lower face 3b and rendering the upper face 3a slightly diffusing.

The arrangement shown in Fig. 6 is similar to that shown in Fig. 3, except that a cylindrical lens 14 is provided at the vertical entry surface of the wedge. This arrangement enables a light source such as the tube 4 in Fig. 4 which emits a divergent beam of light 15 to be used without the provision of an intermediate optical system. The lens 14 will cause the rays impinging upon the inclined wedge plane 10 to be parallel to the base of the wedge, provided that it has been ensured that the light source is arranged at the focal point of this lens.

Fig. 7 shows a wedge-shaped device of transparent material which is similar to that of Fig. 5 except that the entry surface 13a no longer has a rectilinear profile but is cylindrical so as to constitute by itself a lens for the divergent beam 15 in such a way that, with the source arranged in the proper manner, the oblique surface or inclined plane 13b of the wedge receives a beam of light rays parallel with the base 13c of the wedge.

In the above-described devices, the application of the photographic paper to the page to be reproduced is ensured by means of a rigid plane surface (the lower surface of the plate 3 in the case of Fig. 1, and the lower surface of the plate 9 in the case of Figs. 3 and 6 or the lower surface of the transparent wedge in the case of Figs. 5 and 7). With certain books in which the pages have become warped in the course of time, this mode of application may not be sufficient to ensure satisfactory contact between all parts of the page and the photographic paper. A simple means for remedying this consists in arranging underneath the wedge or plate a sufficiently thick cushion of a very pliable transparent material, for example of highly softened polyethylene or polyvinyl chloride material. Fig. 8 shows at 16 a section of such a layer associated with the wedge 13 described with reference to Fig. 7. It will be understood that, if the layer 16 is sufficiently pliable, it will be capable of following more nearly the shape of local uneven places in the page to be reproduced, and in consequence the layer 16 will ensure more satisfactory contact between the photographic paper and this page.

The arrangement shown in Fig. 8 is very simple, but its efficiency is limited. Fig. 9 shows a better arrangement making use of the devices described in the French Specification No. 1,048,025 mentioned previously.

Underneath the wedge of transparent material 13 a pneumatic cushion 17 has been arranged which is made of a transparent synthetic material of very small thickness. It will be understood that this cushion achieves a uniform pressure of the photographic paper upon the page and compensates even for very considerable unevenness in the page to be reproduced. It should also be mentioned that the cushion 17 can be filled not only with air or another gas, but, if this is desired, with a liquid, for example, water. This cushion 17 may be a complete cushion, that is to say, it may consist of two superimposed sheets glued together at the edges, or on the other hand an incomplete cushion which comprises only one single sheet 17a the edges of which are glued to the lower face of the wedge 13 indicated at 17b, either directly or with an interposed spacer of appropriate thickness.

Referring to Fig. 10, a wedge 18 consists of a stack of layers 19 of transparent material having upper and lower surfaces parallel with one another and with the base 18a of the wedge 18. These layers are glued together at their edges but they are not glued to one another over those regions that are required to transmit light. In a modified form, the layers 19 can be glued to one another over their entire surface by means of an adhesive having a refractive index much smaller than that of the transparent material of the layers 19. Whatever the means adopted, if a light ray, such as that shown at 20, which does not form too pronounced an angle with the horizontal plane is directed at the entry surface 18b of the wedge 18, it will penetrate into one of the layers 19 and suffer total reflection at the lower of the horizontal surfaces of this layer. Thereafter it may undergo several interval reflections between the upper and lower surfaces of the layer and will not be able to pass out of the layer before it impinges on the oblique surface or inclined plane 18c of the wedge 18. With this surface having been ground or otherwise rendered diffusing, the light is returned in a generally downward direction so that it may then pass through the lower surface of the relevant layer 19 as well as through the other layers 19 situated beneath it, and the base 18a to effect the illumination of the paper. Thus, a substantially uniform illumination of this paper can be obtained without having to ensure strict centering of the light source relatively to a lens system of some sort.

In the illustrated example the entry surface 18a is straight, but in certain cases it may be of advantage to give it a certain concavity so as to distribute the light in the various layers 19 better and in order to achieve more uniform lighting of the paper in spite of differences in the adsorption of

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the light rays in dependence on the thickness of the material traversed. For the same reason it may be advantageous slightly to increase the thickness of the consecutive layers 19, as shown in the drawing, starting from the base 18a of the wedge 18.

It will be noted that the device shown in Fig. 10 may be regarded as having been derived by the superimposition of plates with parallel surfaces as shown in Fig. 1.

It should be well understood that the base 18a may be provided with a lower resilient layer 16 as in the arrangement shown in Fig. 8, or with a pneumatic cushion 17 as in the arrangement shown in Fig. 9.

Referring to Fig. 11, an air wedge between the horizontal parts 1a of the book and the raised part 1b thereof is formed by means of an inflatable envelope or bag 21 of transparent synthetic material of small thickness. The inflating operation may be effected, for example, by means of a lateral valve, 22, situated at one of the bag ends. Under the influence of pressure, the walls 25 of the bag 21 apply themselves intimately to the opposite pages of the book 1 and thus ensure that the photographic paper 2 is uniformly applied to the page to be reproduced. That part of the bag 21 which is situated in front of the opening of the book is in contact with a cylindrical lens 23 which may be supported by an independent support means (not shown) or simply be fixed to the bag by glueing. The synthetic material employed may by itself provide a diffusing surface applied to the undermost page of the upper stack 1b of the book, or it may be provided with a soft or rigid inner or outer light diffusing coating.

It should also be noted that the translucent nature of the wall of the bag 21 which is applied to the paper 2 is not likely to hinder the reflex-copying operation, but tends to improve the distribution of the light.

The arrangement shown in Figure 11 offers the advantage of ensuring by itself the regular application of the paper 2 to the page to be reproduced, even if the page is not flat, somewhat according to the manner described in French Patent Specification No. 1,048,025 mentioned hereinafter. In the case, therefore, it is possible to do without the layer 16 described with reference to Figure 8 or the pneumatic cushion 17 described with reference to Figure 9.

It should be understood that the internal pressure of the bag 21 tends to open the book further and therefore the book must be restrained against such further opening.

Figure 12 shows a holding device for the book of which a page is to be reproduced. The device is applicable not only to the bag of plastic material shown in Figure 11, but also to the various other forms of wedge described herein. The support shown in

Figure 12 comprises a base 24, a first abutment plate 25 fixed vertically upon the latter, and a second abutment plate 26 inclined so as to diverge in the upward direction from the plate 25, the portion of the plate 26 being adjustable towards and away from the plate 25 by means of threaded coupling bolts 27 integral with said base 24 and passing through slots provided in a foot 26a which is integral with the plate 26, and engageable by winged thumb screws 28. The book 1 is positioned between the two plates 25 and 26 as shown, the stack of leaves 1a the exposed page of which is to be reproduced being adjacent the plate 25. When the photographic paper 2 has been placed upon this page, the wedge-shaped device that it is desired to use (for example, the wedge 13 described with reference to Figure 7) is pushed into the half-open book. The light source must of course be arranged above the apparatus in this case so that the light beam which impinges upon the inclined surface of the wedge should be composed of downwardly directed rays.

If the wedge is to be employed in the form of an inflatable bag as shown in Figure 11, this wedge is preferably introduced in the book in the deflated state and subsequently inflated so as to facilitate its correct positioning and to avoid forming creases.

WHAT WE CLAIM IS:—

1. A process for the reproduction by reflex-copying of a page of a bound book or other bound documents, wherein the illumination of the photographic material that is placed on the page to be reproduced is effected by means of a beam of light of which the mean direction is substantially parallel to the plane of the page to be reproduced and which is caused to fall on the photographic material by undergoing reflection or diffusion at a surface that is substantially parallel to, or is inclined at an acute angle to, the page to be reproduced.

2. A process as claimed in Claim 1, wherein a substantially parallel-sided plate of a transparent material is inserted into the book between the photographic material and the page opposite the page that is to be copied, the face of the plate that is adjacent to the photographic material being ground, the beam of light is caused to enter the plate through one of its edges and undergoes successively total internal reflection at the surface of the plate remote from the photographic material and partial reflection at the surface of the photographic material.

3. A process as claimed in Claim 2, wherein the degree of grinding of the surface of the plate that is adjacent to the photographic material is so graded in accordance with distance from the edge of the plate at which the light beam enters the

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plate that the surface of the photographic paper remote from the page to be reproduced is substantially evenly illuminated.

4. A process as claimed in Claim 1, wherein the book is opened at an acute angle and the page of the book facing the page to be reproduced provides the said light reflecting or diffusing surface.

5. A process as claimed in Claim 1, wherein the book or other document is opened at an acute angle and a reflecting or diffusing plate which is inclined at an acute angle with respect to the page to be reproduced is used to provide the said light reflecting or diffusing surface.

6. A process as claimed in either Claim 4 or Claim 5, wherein a rigid transparent plate is laid on the photographic material to press it against the page to be reproduced.

7. A process as claimed in Claim 1, wherein the book or other document is opened at an acute angle and there is inserted between the page to be reproduced and the facing page a wedge of transparent material, the base of which extends over the whole of the area of the page to be reproduced and the oblique face of which provides the said light reflecting or diffusing surface.

8. A process as claimed in Claim 7, wherein the oblique face is in contact with the page facing the page to be reproduced.

9. A process as claimed in Claim 7 or Claim 8, wherein the base of the wedge is ground.

10. A process as claimed in Claim 9, wherein the grinding of the base is so graded in accordance with the distance from the side of the wedge at which the light beam enters that the surface of the photographic material remote from the page to be reproduced is substantially evenly illuminated.

11. A process as claimed in Claim 7 or Claim 8, wherein the acute angle subtended between the oblique face and the base of the wedge is not less than 10° and the incident beam of light converges to a degree sufficient to cause the surface of the photographic material remote from the page to be reproduced to be substantially evenly illuminated.

12. A process as claimed in any one of Claims 5 to 11, wherein the entry surface of the wedge is so shaped that the end portion of the wedge serves as a lens to impart to the light beam incident on the entry surface a given degree of convergence or divergence or to create from the incident beam a parallel beam of light.

13. A process as claimed in any one of Claims 1 to 12, wherein the light source is of tubular shape and is arranged with the axis of the tube parallel to the longitudinal axis of the book or other document, and optical means is provided to impart to the light beam any given degree of divergence or convergence or to create a parallel beam.

14. A process as claimed in Claim 13, wherein the light source is a fluorescent lamp.

15. A process as claimed in either Claim 6 or in any one of Claims 7 to 12, wherein there is interposed between that surface of either the plate or the wedge, respectively, that is adjacent to the photographic material and the surface of the photographic material remote from the page to be reproduced a layer of resilient deformable transparent material to cause substantially face-to-face contact between the photographic material and the page to be reproduced.

16. A process as claimed in either Claim 6 or in any one of Claims 7 to 12, wherein there is interposed between that surface of either the plate or the wedge, respectively, that is adjacent to the photographic material and the surface of the photographic material remote from the page to be reproduced a transparent pneumatic cushion to cause substantially complete face-to-face contact between the photographic material and the page to be reproduced.

17. A process as claimed in any one of Claims 7 to 12 or either Claim 15 or Claim 16 when dependent upon any one of Claims 7 to 12, wherein the wedge of transparent material is formed of a plurality of discrete surface layers having side faces parallel to the base of the wedge, the light beam entering the wedge is divergent, and the parts of the light beam that enter these layers are each caused to undergo internal reflection on the parallel faces of the layers and are, for the most part, prevented from leaving the layers until they reach the oblique surface of the wedge, the light beam then being caused by reflection or diffusion to pass in a mean direction that is towards the base of the wedge.

18. A process as claimed in Claim 17, wherein the layers increase in thickness with increasing distance from the photographic material.

19. A process as claimed in Claim 17 or Claim 18, wherein the entry surface of the wedge is concave.

20. A process as claimed in Claim 1, wherein the book or other document is opened at an acute angle and an inflated wedge-shaped bag of transparent sheet material is positioned between the page to be reproduced and the facing page with its base extending over the whole of the regions of the page in contact therewith that are to be reproduced and with its oblique face in contact with the facing page, any tendency for the inflated bag to cause the book or other document to be further opened being prevented.

21. A process as claimed in Claim 20,
wherein the oblique surface of the wedge-
shaped bag is rendered light diffusing or
provided with a soft or rigid light diffusing
5 coating.

22. A process as claimed in Claim 20 or
Claim 21, wherein the lens is situated adja-
cent the entry surface of the wedge-shaped
bag and the light beam is caused to enter
10 the bag as a substantially parallel beam.

23. A process for the reproduction by

reflex-copying of a page of a bound book
or other bound documents conducted sub-
stantially as described herein with reference
to the accompanying drawings.

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944746

COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

FIG. 1.

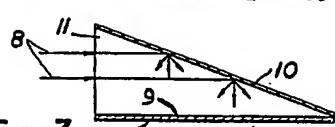


FIG. 3.

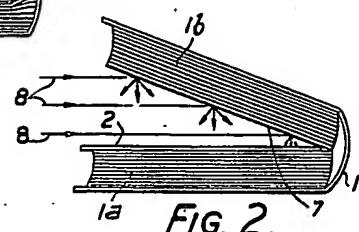


FIG. 2.

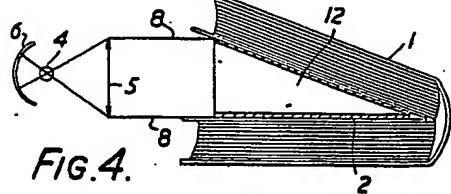


FIG. 4.

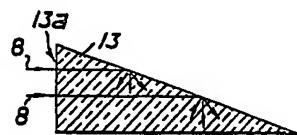


FIG. 5.

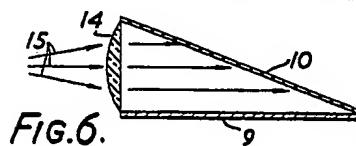


FIG. 6.

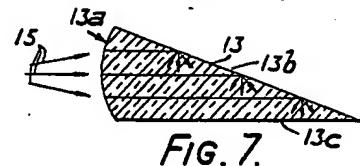


FIG. 7.

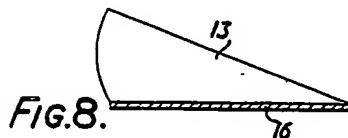


FIG. 8.

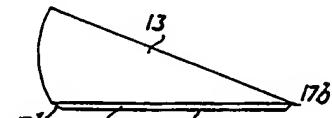


FIG. 9.

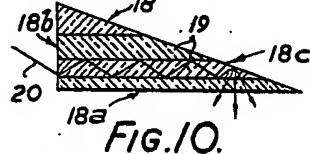


FIG. 10.

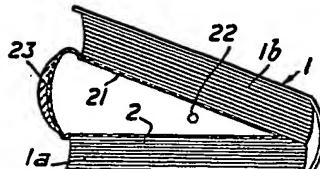


FIG. 11.

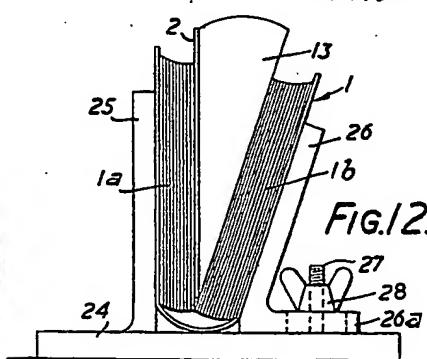


FIG. 12.

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